

Bionet at 30 years of open science communication

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Abstract: Bionet has provided open access, Internet news groups and discussion for many thousands of life scientists for 30 years (www.bio.net). A new supporting organization is sought to continue Bionet into its fourth decade. It maintains values as an open communication venue used and sponsored by bio-scientists, despite popular commercial venues, and cyber-crime/security that impinge on such.

Bionet is a set of open access, Internet communication forums used by life scientists around the world. Bionet news and discussion groups, also known as BIOSCI, started in 1988 as part of the NIH Genbank contract at Intelligenetics in Stanford, later at UK partner MRC Rosalind Franklin Centre, now is hosted at Indiana University (Benton 1990; Gilbert 2004). It has proven resilient to changes in Internet science discussion venues.

A fourth supporting organization is sought to continue Bionet into its fourth decade. There are continuing values in this communication forum, as there are costs, outlined in this report. Bionet includes 30 active discussion groups, with 15,000 subscribers, distributed by E-mail and Usenet (Table 1). Its news archives span from 1988 to present, at <http://www.bio.net/>. Topics include molecular biology methods, bioinformatics software and computational biology, general announcements and news, and several animals and plant communities including annelida, arthropods, fruitfly, maize, medicago, and zebrafish.

BIOSCI/Bionet was started in conjunction with the GenBank project, by Intelligenetics at Stanford University in the mid 1980s, in collaboration with the United Kingdom's MRC Rosalind Franklin Centre for Genomics Research (Kristofferson 1988, 1991; Eckstrand 1991). In 2005, with the closing of MRC Rosalind Franklin Centre, Bionet moved to IUBio Archive at the Indiana University Biology Department. Michael Ashburner, a founder of BIOSCI with Dave Kristofferson, wrote of its origins "... in the early 1980s, Martin Bishop and I ran an email news service for a sequence analysis service that we ran on the Cambridge IBM 3084Q mainframe. I was also a user of MOLGEN at Stanford, and there Dave Kristofferson ran an internal bulletin board using ANU News. We combined forces to start the Bulletin boards."

As one of the earliest biology community projects on the Internet, GenBank project supported Bionet news groups for promoting open access communications (Benton et al. 2006). GenBank project acquired the bio.net domain and Usenet Bionet hierarchy for these purposes. GenBank transitioned in 1989 to 1992 to then new National Center for Biotechnology Information. Bionet continued separately under support of interested organizations. Bionet news is copied at Google

groups Usenet section, at Nabble.com, and other services. It's combined mail-list and Usenet dissemination is unique, and Usenet remains in use by a subset of readers.

Open access Internet publication of science has attendant costs accruing from Internet mis-use by many opportunists and criminals. Biosci and IUBio Archive started when the Internet was limited to government and academic use, through early 1990s. Spam e-mail started early, via academic accounts, with severe effects when Internet opened to everyone. Anti-spam methods are in place, but inappropriate messaging continues to impede science communications. Criminal and destructive activities are increasing problems. Indiana University information technologists have recently re-focused on cyber-security, restricting their 30 year support. Bionet and the author's services benefitted from this open Internet support, but cannot continue under new cyber-security restrictions. Makers of Internet policy should take note that science communications suffer from escalating cyber-crime and security responses.

A host organization that will maintain or expand this unique resource is sought. Suggestions include (1) an established biology-oriented center that already maintains public E-mail lists with the popular GNU-Mailman system used by Biosci; (2) open-access science communication credentials; (3) possible re-location to an Old World home, in Europe or Asia-Pacific, as Bionet receives continuing high use from these areas. The alternative of a new institutional home for Bionet will be up to group members, with options of commercial offerings like Google Groups, Twitter, FaceBook, and others. Although Google Groups receives copies of Bionet messages via Usenet, there is no simple way to switch it to Google as host. We are now aware that commercial systems have mis-use problems similar to prior non-commercial ones. There are new efforts toward a decentralized Web (DWeb, 2018), which harken back to the Usenet model. These facets may be a further reason for re-invigorating Bionet as an open science forum.

Bionet is Internet social media for scientists in its early form, started and maintained by bioscientists. Current Bionet subscribers have a large say in its future. Discussion of Bionet's future can proceed on the list Bionet.general, email: bioforum@net.bio.net, and any bioscience reader may join this discussion. Suggestions and comments may also be emailed to this author, please request anonymity if desired.

Bio-mirror project at www.bio-mirror.net, part of IUBio Archive, also seeks a new supporting organization for its USA site. Bio-mirror is an international sharing of public genomic data and knowledge, with development of world-wide data exchange, begun in 1998 by this author in collaboration with global partners (Gilbert et al. 2014). Primary data sources are bio-sequence data from NCBI and EBI. Additional databases in re-distribution include UniProt, Gene Ontology, Taxonomy, and other life sciences data. The costs are in actively maintaining collections of genomics databases, as many organizations do for local uses, and open access redistribution, with attendant open access costs. Of value is Bio-mirror's continuing usage for 20 years, including re-distribution to a core dozen of North American sites, plus many occasional customers, and continued facilitation for world partners in Japan, Australia, Singapore, Europe, Africa, as well as S. and N. American sites.

Table 1. Bionet News Groups usage, 2007-2017, number of readers (valid email) and posts.

Year	2007		2013		2017	
	Group	Read	Read	Post	Read	Post
Annelida		503	559	299	570	305
Arab-Gen		1299	1605	283	1511	155
Dros		361	399	65	405	39
Maize		215	273	29	250	22
Plantbio		287	393	14	312	46
Zebrafish		356	398	93	345	29
Bionews		291	300	39	264	26
Comp-Bio		270	315	126	282	65
Genbankb		144	207	16	207	16
Methods		602	811	118	676	26
Neur-Sci		299	455	22	487	1
All		13774	17262	1419	15423	868

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